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Nonlocal Hadron interaction and problem of describing low-energy nucleon-ucleon scattering

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Abstract

The problem of describing scattering in a quantum system whose dynamics is governed by interaction that is nonlocal in time has been investigated. In the case of nucleon-nucleon interaction at low energies, such a nonlocality can be associated with quark and gluon degrees of freedom. A model is constructed that appears to be a nonlocal generalization of the Yamaguchi model. Specific calculations show that this generalization leads to better agreement with experimental data on low-energy neutron-proton scattering. It has been shown that a description of nucleon-nucleon interaction in terms of conventional realistic potentials can be generalized to the case where the phenomenological short-range component of this interaction is nonlocal in time.